Amendments to the Claims:

This listing of claims will replace all prior versions and listings of claims in the application:

Listing of Claims:

Cancel claims 1-41.

42. (New) An evanescent wave cavity-based optical sensor, the sensor comprising:

an optical cavity formed by a pair of highly reflective surfaces such that light within said cavity makes a plurality of passes between said surfaces, an optical path between said surfaces including a reflection from a totally internally reflecting (TIR) surface, said reflection from said TIR surface generating an evanescent wave to provide a sensing function;

a light source to inject light into said cavity; and

a detector to detect a light level within said cavity; and

wherein said TIR surface is provided with a functionalising material over at least part of said TIR surface such that said evanescent wave interacts with said material;

whereby an interaction between said functionalising material and a target to be sensed is detectable as a change in absorption of said evanescent wave.

43. (New) A sensor as claimed in claim 42 wherein said sensor is a cavity ring-down sensor, wherein said cavity is a ring-down optical cavity for sensing a substance modifying a ring-down characteristic of the cavity; wherein said light source comprises a continuous wave light source for exciting said cavity; and wherein said detector is configured to monitor said ring-down characteristic, said sensed substance modifying said cavity ring-down characteristic.

44. (New) A sensor as claimed in claim 42 wherein a portion of said TIR surface to which said material is attached has substantially no features with a dimension perpendicular to said surface of greater than 1μm.

45. (New) A sensor as claimed in claim 42 wherein said functionalising material comprises a solvating medium to convert a gas-phase target to a solution at said TIR surface.

46. (New) A sensor as claimed in claim 42 wherein said TIR surface is provided with a partition or atrium configured to allow selective transport of entities via said partition or atrium to or from said TIR surface.

47. (New) A sensor as claimed in claim 46 wherein said partition or atrium is configured for application of a charge or potential to control said selective transport.

48. (New) A sensor as claimed in claim 42 wherein said material includes a tether or link to attach the material to said surface.

49. (New) A sensor as claimed in claim 42 wherein said material is directly attached to said TIR surface.

50. (New) A sensor as claimed in claim 42 wherein said material provides fractional monolayer coverage of said TIR surface, wherein said fractional coverage is less than 10^{-1}.

51. (New) A sensor as claimed in claim 50 wherein said fractional cover is less than 10^{-2}.

52. (New) A sensor as claimed in claim 50 wherein parts of said TIR surface not covered by said material are passivated.

53. (New) A sensor as claimed in claim 42 wherein said material comprises a crown ether or derivative thereof.

54. (New) A sensor as claimed in claim 42 wherein said material comprises DNA or RNA attached to said TIR surface by one or more complementary base pairs.

55. (New) A sensor as claimed in claim 42 wherein said material functionalising said surface comprises two components, one with an affinity or attraction for said target and a second to facilitate interaction with said evanescent wave.

56. (New) A sensor for a cavity of an evanescent-wave optical sensing device, the sensor comprising a fibre optic cable having a core configured to guide light down the fibre surrounded by an outer cladding of lower refractive index than the core, wherein a sensing portion of the fibre optic cable is configured have a reduced thickness cladding provided with a functionalising material which has a selective response to a target such that an evanescent wave from said guided light interacts with said material and is modified by the presence of said target.

57. (New) A sensor as claimed in claim 56 wherein said sensing portion of said fibre optic cable to which said functionalising material is attached has substantially no features with a dimension perpendicular to a surface of said sensing portion of greater than 3μm.

58. (New) A sensor as claimed in claim 56 wherein said functionalising material provides no more than substantially monolayer coverage of said sensing portion of said fibre optic cable.

59. (New) A sensor as claimed in claim 56 wherein said sensing portion of said fibre optic cable is only partially covered by said functionalising material, and wherein parts of said sensing portion not covered by said functionalising material are passivated.

60. (New) A sensor as claimed in claim 56 wherein said functionalising material includes a tether or link to attach the material to said sensing portion of said fibre optic.

61. (New) A sensor as claimed in claim 56 wherein said functionalising material comprises a solvating medium to convert a gas-phase target to a solution at said sensing portion of said fibre optic.

62. (New) A sensor as claimed in claim 56 wherein said sensing portion of said fibre optic is provided with a partition or atrium configured to allow selective transport of entities via said partition or atrium to or from said sensing portion.

63. (New) A sensor as claimed in claim 56 wherein said sensing portion of said fibre optic cable provided with said functionalising material is configured to substantially inhibit scatter of said guided light.

64. (New) A sensor as claimed in claim 56 wherein said optical sensing device comprises a cavity ring-down device

65. (New) A sensor as claimed in claim 56 wherein said functionalising material comprises two components, one with an affinity or attraction for said target and a second to facilitate interaction with said evanescent wave.

66. (New) An optical cavity-based gas-phase sensing device comprising:

an optical cavity absorption sensor comprising an optical cavity formed by a pair of reflecting surfaces;

a light source for providing light to couple into said cavity; and

a light detector for detecting a level of light escaping from said cavity;

wherein said optical cavity includes a sensing device comprising a functionalised optical interface, said optical interface being provided with a solvating medium to convert a gas-phase target to a solution at said interface.

67. (New) A sensing device as claimed in claim 66 wherein said functionalised optical interface comprises two components, one with an affinity or attraction for said target and a second to facilitate interaction with said evanescent wave.

68. (New) A sensing device including an optical interface to which is attached a material which has a selective response to a target such that an evanescent wave at said interface is

modified by said target, said device further comprising a partition configured to allow selective transport of entities via said partition to or from said interface.

69. (New) A sensing device as claimed in claim 68 wherein said partition is configured for application of a charge or potential to control said selective transport.

70. (New) A sensing device as claimed in claim 68 wherein said entities are electrically charged.

71. (New) A sensing device as recited in any claimed in claim 68 wherein said material comprises two components, one with an affinity or attraction for said target and a second to facilitate interaction with said evanescent wave.

72. (New) A sensing device including an interface to which is attached a material which has a selective response to a target, wherein said interface is an optical interface, such that an evanescent wave at said interface is modified by said target, and wherein said interface is further provided with a photoelectron generator to assist in refreshing said interface.

73. (New) A method of refreshing an interface to which is attached a material which has a selective response to a target, the method comprising:

providing said interface with a photoelectron generator; and

illuminating said photoelectron generator to release electrons to refresh said interface.

74. (New) An optical charge/capacitance sensor for providing an optical signal responsive to charge and/or capacitance at an optical interface, said sensor comprising a light input and a light output and being configured to provide an optical path between said light input and said light output, said optical path including a totally internally reflecting (TIR) optical interface for attenuated TIR-based sensing, said TIR interface being treated such that a change in charge and/or capacitance at said interface causes a change in absorbance of light travelling between said light input and said light output.

75. (New) A sensor as claimed in claim 74 wherein said interface treatment comprises partially providing said interface with light absorbing molecules.

76. (New) A sensor as claimed in claim 74 wherein said interface comprises a silica interface.